

PATENT COOPERATION TREATY

From the:
INTERNATIONAL SEARCHING AUTHORITY

To:

Cullen & Co
GPO Box 1074
BRISBANE QLD 4001

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) 27 OCT 2004

Applicant's or agent's file reference
040936PC

FOR FURTHER ACTION
See paragraph 2 below

International application No.

PCT/AU2004/001080

International filing date (day/month/year)

12 August 2004

Priority date (day/month/year)

15 August 2003

International Patent Classification (IPC) or both national classification and IPC

Int. Cl. 7 C25B 1/04; C01B 3/02, 3/10

Applicant

PROTEGY LIMITED et al

1. This opinion contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|--|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the opinion |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input checked="" type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the IPEA/AU
AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized Officer

MR KIM WELLENS

Telephone No. (02) 6283 2162

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Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims -	YES
	Claims 1- 10	NO
Inventive step (IS)	Claims -	YES
	Claims 1- 10	NO
Industrial applicability (IA)	Claims -	YES
	Claims 1- 10	NO

2. Citations and explanations:

- ✓ D1- WO 2000/017418 A1 (The Regents of the University of California), 30 March 2000
- ✓ D2- GB 1490650 A (Blum P.), 2 November 1977
- ✓ D3- GB 2010333 A (Kernforschungsanlage Julich GmbH), 27 June 1979
- ✓ D4- WO 1994/012690 (Lasich J), 9 June 1994
- ✓ D5- EP 1006078 A1 (Yosohiro S et al.), 7 June 2000
- ✓ D6- DE 3101210 A1 (Dornier System GmbH.), 29 July 1982 & Derwent Abstract Accession No. 63841 E/31, Class E36, J03
- ✓ D7- DT 2549471 A1 (Dornier System GmbH), 12 May 1977 & Derwent Abstract Accession No. 34643Y/20 Class E36, J03
- ✓ D8- Derwent Abstract Accession No. 2000- 497491/44, Class E36, J03, PT 102238 A (Ramirez Garcia J.), 31 July 2000
- ✓ D9- Derwent Abstract Accession No. 47774B/26, Class E36, J03, JP 54-061088 A (Hitachi Shipbld Eng KK), 17 May 1979
- ✓ D10- Derwent Abstract Accession No. 47775B/26, Class E36, J03, JP 54-061089 A (Hitachi Shipbld Eng KK), 17 May 1979
- ✓ D11- Derwent Abstract Accession No. 33534 K/14, Class E36, J03, JP 58034183 A (Arakawa T), 28 February 1983
- ✓ D12- Derwent Abstract Accession No. 94-084061/11, Class X25, CN 1072465 A (Zheng J), 26 May 1993
- ✓ D13- "Physical Chemistry" 3rd Ed. P.W. Atkins, Oxford University Press, 1986. ISBN 0-19-855196-7.
- ✓ D14- WO 2000/070699 (Protegy Limited), 23 November 2000

Novelty (N) and Inventive Step (IS) claim 1

Claim 1 is merely a reiteration of the laws of thermodynamics and kinetics. In particular the reaction:

$\text{H}_2\text{O}_{(l)} \rightarrow \text{H}_2 + 1/2\text{O}_2$ has enthalpy of + 285.83 KJ.mol⁻¹. Hence it is endothermic. Consequently it will follow the well known law for endothermic reactions in that "increased temperature favours the products". This is outlined in D13. Furthermore it is well understood that the reaction rate increases with an increase in temperature, again outlined in D13. Documents D1- 12 clearly disclose the application of these principles in the electrolysis of water, by elevating the temperature (in most cases well above the boiling point of water) of the reactants during electrolysis. Consequently claim 1 is not novel and does not involve an inventive step.

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Box No. VI Certain documents cited

1. Certain published documents (Rules 43bis.1 and 70.10)

<u>Application No. Patent No.</u>	<u>Publication date (day/month/year)</u>	<u>Filing date (day/month/year)</u>	<u>Priority date (valid claim) (day/month/year)</u>
P,X, Y JP 2004210597	29 July 2004	Unavailable	6 January 2003

The document discloses all of the features of claim 1. When this document is combined with D14 in an obvious manner, it discloses all of the features of claims 2- 10.

2. Non-written disclosures (Rules 43bis.1 and 70.9)

Kind of non-written disclosure

Date of non-written disclosure
(day/month/year)

Date of written disclosure
referring to non-written disclosure
(day/month/year)

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The E^0 value given at page 11, line 7; page 13, lines 15 and 32 appears to be erroneous. The value as established* and also quoted in the specification (page 2, line 22) is -0.83V. (*Source "Physical Chemistry" 3rd Ed. P.W. Atkins, Oxford University Press, 1986. ISBN 0-19-855196-7. pp 825, Table 12.1).

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: V

Inventive Step (IS) claims 2- 10

Document D14 by the applicant introduces their concept of combining two half cell reactions, with the idea of increasing hydrogen production. The teachings from this document may be combined with any of documents D1- D13 to produce a method of producing H_2 of the sort disclosed by D14 with an "increased number of dissociated H_2O molecules" near the reactive surface. Consequently claims 2- 10 do not involve an inventive step.